3-1-2017

Substance use and treatment outcomes among Spanish-speaking Latino/as from four acculturation types.

Kelly Serafini
Swedish Medical Center

Dennis C Wendt

India J Ornelas

Suzanne R Doyle

Dennis M Donovan

HHS Public Access

Author manuscript

Psychol Addict Behav. Author manuscript; available in PMC 2018 March 01.

Published in final edited form as:

Psychol Addict Behav. 2017 March ; 31(2): 180–188. doi:10.1037/adb0000245.

Substance Use and Treatment Outcomes Among Spanish-Speaking Latino/as from Four Acculturation Types

Kelly Serafini[1], **Dennis C. Wendt**[2,3], **India J. Ornelas**[4], **Suzanne R. Doyle**[2], and **Dennis M. Donovan**[2,3]

[1]Swedish Family Medicine Residency, Seattle, WA 98104 USA

[2]Alcohol and Drug Abuse Institute, University of Washington, Seattle, WA 98105 USA

[3]Department of Psychiatry and Behavioral Sciences, University of Washington School of Medicine, Seattle, WA 98105 USA

[4]Department of Health Services, University of Washington, Seattle, WA 98105 USA

Abstract

Objective—The purpose of this study was to examine the association of acculturation with substance use treatment outcomes in a sample of treatment-seeking Latino/as (N = 405).

Method—The study used data from a multisite randomized controlled trial of a culturally-adapted version of Motivational Enhancement Therapy delivered in Spanish. Berry et al.'s (1987) acculturation model was used to divide the sample into four types (Integrated, Assimilated, Separated, Marginalized), based on Bicultural Involvement Questionnaire scores. One-way ANOVAs, chi-squared tests, and repeated-measures regression were used to examine baseline acculturation, post-treatment outcomes, and follow-up outcomes.

Results—All participants were of Latino/a background and 88.4% of the sample was male. Participants with greater acculturation to American culture (i.e., Integrated and Assimilated acculturation types) reported more substance use and associated problems at baseline ($\chi^2(3) = 20.5$, $p < .001$), with the Integrated type reporting the highest percentage of substance use disorder symptoms and problems (67.6%). No significant differences in substance use were detected among acculturation types post-treatment or at follow-up.

Conclusions—Although the Integrated and Assimilated acculturation types were associated at baseline with more substance use and associated problems, all acculturation types seemed to benefit at post-treatment from an evidence-based culturally-adapted treatment.

Keywords

acculturation; Latino/a; substance use; treatment outcomes

In 2010 Latino/as[1] comprised 17% of the U.S. population, and by 2050 they are projected to comprise 29% (U.S. Census Bureau, 2015). For the substance use treatment field, it is

Corresponding Author: Kelly Serafini, Ph.D., Swedish Family Medicine Residency, 1401 Madison Street, Seattle, WA 98104, Kelly.serafini@swedish.org.

imperative to understand the unique strengths and challenges of this growing population. It has been found that Latino/as are less likely than Caucasians (non-Hispanic Whites) to seek and remain engaged in treatment for substance use disorders (SUDs), due in part to barriers to service utilization (Guerrero, Marsh, Khachikian, Amaro, & Vega, 2013). Additionally, Latino/as tend to have poorer SUD treatment outcomes than other ethnic groups, perhaps due to poorer treatment retention rates (Alvarez, Jason, Olson, Ferrari, & Davis, 2007; Brecht, von Mayrhauser, & Anglin, 2000; Prendergast, Hser, & Gil-Rivas, 1998). These disparities highlight the importance of research concerning how treatment services may be improved for this population.

Although multiple studies have indicated that Latino/as generally drink alcohol at a frequency equal to or less than Caucasians (O'Malley & Johnston, 2002; Vega, Gil, & Kolody, 2002), Latino/as who do drink alcohol tend to consume greater quantities and are more likely to binge drink (Caetano, Ramisetty-Mikler, & Rodriguez, 2008; Worby & Organista, 2013). Additionally, Latino men are more likely to experience negative consequences as a result of their drinking (Mulia, Ye, Greenfield, & Zemore, 2009). Less research has addressed Latino/as' use of illicit drugs; however, studies suggest that Latino/as use illicit drugs at a similar rate as Caucasians (National Institute on Drug Abuse, 1998) but experience more severe consequences, such as more accidental drug overdoses (Coffin, Galea, Ahern, Leon, Vlahov, & Tardiff, 2003), more incarcerations for drug possession, and harsher legal sentences for drug use (Beckett, Nyrop, Pfingst, & Bowen, 2005).

These patterns of alcohol and drug use and related consequences among Latino/as are frequently explained in terms of acculturation, the process of psychological and social changes resulting from exposure to a new culture (Berry, 2003). There is accumulating evidence that greater acculturation to mainstream U.S. culture is associated with higher substance use severity among Latino/as generally (Caetano, Ramisetty-Mikler, & Rodriguez, 2009; Chartier et al., 2015; Kaplan & Marks, 1990; Spence, Wallisch, & Smith, 2007; Vega, Gil, & Zimmerman, 1993), even when controlling for demographic characteristics and country of origin (Amano et al., 1990; Burnam, Hough, Karno, Escobar, & Telles, 1987). The impact of acculturation appears to be especially strong for Latina women, with low levels of acculturation associated with less drinking and higher levels of acculturation associated with greater drinking (Lee, Almeida, Colby, Tavares, & Rohsenow, 2015; Polednak, 1997; Zemore, 2007; but see Zamboanga et al., 2006, for an exception). Although substantial research has identified a link between acculturation and substance use, the mechanisms behind the association are less clear. There has been limited research on the topic, and speculations include the fact that highly acculturated Latino/as may have employment in which they have higher income (greater access to alcohol), as well as a greater likelihood of having negative consequences of their alcohol use (missed days of work, greater likelihood of vehicle ownership which may increase the risk of legal and health consequences). It may also be that there is greater acceptance of substance use among

[1]Several terms have been used for this heterogeneous group of individuals that are either from or descended from a Latin American country and/or are Spanish-speaking. These include *Hispanic* (a term created by the U.S. Census Bureau in 1970 to identify Spanish-speakers), *Latino/a* (heritage related to Latin America), and subgroups that identify themselves, for instance, by country of origin or geographic location (e.g., Mexican American or *Chicano*). Throughout this article, we use the term Latino/a, as it reaffirms pre-Hispanic identity (Comas-Diaz, 2001; Falicov, 1998).

U.S. culture, which could contribute to the link between acculturation and worsened substance use outcomes (Caetano et al., 2009).

Because Latino/as receiving SUD treatment have higher rates of substance use than non-clinical samples, it is important to examine how acculturation is related to treatment outcomes (Alvarez, Olson, Jason, Davis, & Ferrari, 2004). Very few studies have examined the impact of acculturation on substance use treatment. One study found that acculturation did not differentiate drinking patterns (Arciniega, Arroyo, Miller, & Tonigan, 1996) and another found that acculturation did not mediate substance use treatment response (Arroyo, Miller, & Tonigan, 2003). (In the latter study, however, monolingual Spanish-speakers were ineligible to participate, and so less acculturated Latino/as were likely to have been underrepresented.) In a separate study of court-mandated Latino/a SUD patients, higher acculturation was associated with greater treatment retention (Brocato, 2013). There also is evidence that less acculturated clients benefit most from having providers from the same ethnic background (Field & Caetano, 2010) and that providers' level of acculturation to the United States is associated with greater days of substance use among their Spanish-speaking patients (Suarez-Morales et al., 2010). Given these mixed findings, it is uncertain how SUD treatment outcomes are affected by cultural processes.

Recently, Chartier and colleagues (2015) examined acculturation within a multi-site randomized controlled trial for Spanish-speaking Latino/a clients. In this study, participants who reported more connection with Latino culture had a higher attrition rate, while participants who were born in the U.S. and preferred to speak English at home had a lower percentage of days abstinent at the end of treatment. However, the Chartier et al. (2015) study was largely exploratory, and the authors recommended that future studies utilize a theoretical framework to inform hypothesis-driven investigations to build upon their preliminary findings. Our study builds upon the study by Chartier and colleagues (2015) within the same treatment sample by applying a theoretical model of acculturation to treatment processes.

For this study, we utilized Berry and colleagues' (Berry, Kim, Minde, & Mok, 1987) acculturation model to assess the influence of acculturation on baseline substance use and treatment outcomes. Berry et al. (1987) proposed a quadrant model to depict the level of acculturation between the host culture and native culture, with the following four types for any given individual: *integration* (identifying highly with both cultures), *assimilation* (identifies more with U.S. mainstream culture), *separation* (identifies more with Latino/a culture), and *marginalization* (reports distance from both cultures). Berry (2005) proposed that integrated (i.e., bicultural) individuals tend to have less acculturative stress and better quality of life outcomes compared to those who are marginalized. Many studies that have examined acculturation have only used single-item measures of the construct (e.g., language preference or number of years lived in the U.S.), and thus a strength of the present study is the use of a more thorough instrument of acculturation. In addition to using Berry and colleagues' acculturation model, we also examined cultural context by assessing language, years of education, and years lived in the U.S. (Schwartz, Unger, Zanboanga, & Szapocznik, 2010).

The purpose of our study was to use Berry's et al.'s (1987) model to examine how acculturation is related to baseline substance use and treatment outcomes among Latino/as, as the relationship between acculturation and substance use is unclear among treatment-seekers. Our study describes the distribution of Berry et al.'s four acculturation types (Integrated, Separated, Assimilated, and Marginalized) in a sample of Spanish-speaking Latino/as enrolled in a randomized clinical trial of culturally-tailored SUD treatment at baseline, post-treatment, and follow-up. Our study consisted of two *a priori* hypotheses and two exploratory analyses. Our first *a priori* hypothesis was that our method of assessing acculturation using Berry et al.'s model would be valid in comparison to other items used to assess acculturation (e.g., language preference, number of years lived in the U.S.). Our second *a priori* hypothesis was that participants in the Integrated and Assimilated groups (indicating higher acculturation to U.S. society) would have higher levels of substance use at baseline compared to those in the Separated and Marginalized groups (indicating lower acculturation to U.S. society), as a robust literature has indicated that greater acculturation to American culture among Latino/as is related to higher rates of substance use. Given the limited literature on acculturation and SUD treatment, we did not make hypotheses about acculturation and post-treatment outcomes. Our first exploratory analysis examined the association between baseline acculturation and SUD treatment outcomes at post-treatment and at follow-up. Our second set of exploratory analyses examined the relationship between acculturation and treatment assignment on SUD treatment outcomes.

Method

Overview of Randomized Controlled Trial

Data for these analyses were collected as part of a randomized controlled trial sponsored by the National Institute on Drug Abuse's Clinical Trials Network (NIDA CTN). The multisite trial took place in five U.S. treatment centers ($N = 405$) in Oregon, New Mexico, New York, Colorado, and Florida (Carroll et al., 2009). The treatment centers were located in urban areas. Participants were randomized to one of two treatment conditions: Motivational Enhancement Therapy delivered in Spanish (MET-S) and Counseling as Usual delivered in Spanish (CAU). Motivation Enhancement Therapy is an evidence-based psychotherapy, based on principles of motivational interviewing, in which motivation to reduce or quit substance use is strengthened (Miller & Rollnick, 2013). For both conditions, treatment consisted of three individual-format sessions over four weeks, and all study materials were provided in Spanish (Suarez-Morales et al., 2007). The main finding from the original trial was that participants in both treatment conditions reduced their substance use, with no differences between conditions across time (Carroll et al., 2009). More information on the parent study can be accessed by Carroll and colleagues' (2009) manuscript.

Participants

Patients were eligible if they 1) were seeking outpatient treatment for substance use; 2) reported substance use within the previous 28 days; 3) were at least 18 years old; 4) spoke Spanish; and 5) were considered by clinical staff to be appropriate for outpatient care. Of the 405 participants included in intention-to-treat analyses, 266 completed all three treatment

sessions (65.7% completion rate). For more information about participation recruitment and engagement, refer to Carroll et al. (2009).

Measures

The following measures were used for analyses reported in this article.

Demographic characteristics—Demographic information was collected at baseline, using a standard CTN demographics questionnaire. Variables included for this study were age, gender, race/ethnicity, country of origin, years living in the U.S. (not including Puerto Rico), years of education, months of incarceration, and number of previous alcohol/drug treatment episodes.

Acculturation—The Bicultural Involvement Questionnaire (BIQ) was used to measure acculturation (Szapocznik, Kurtines, & Fernandez, 1980). The BIQ contains 33 self-report items which produce two scale scores: Americanism and Hispanicism. These scales assess the level of endorsement of cultural practices and rituals within American and Latino/a cultures, respectively. Participants rated on a five-point Likert scale (1 = *Not at all Comfortable*; 5 = *Very Comfortable*) their comfort speaking English/Spanish in a variety of settings (e.g., home, work, with friends) and their enjoyment of cultural practices and media (e.g., music, dances, holidays, books and magazines, and television programs). In other investigations, internal consistency has been rated as excellent with scores above .90 for the Americanism and Hispanicism scales (Coatsworth, Maldonado-Molina, Patin, & Szapocznik, 2005).

For these analyses, we used the Americanism and Hispanicism scale scores to create a quadrant model based on Berry and colleagues' (1987) acculturation framework (described above). The quadrant model was created through a median split method (Farver, Bhadha, & Narang, 2002), resulting in four acculturation types based on above-median and below-median scores on the two scales: Integration (high Americanism/high Hispanicism), Assimilation (high Americanism/low Hispanicism), Separation (low Americanism/high Hispanicism), and Marginalization (low Americanism/low Hispanicism). (See Farrelly, Cordova, Huang, Estrada, & Prado, 2013, for a similar attempt at approximating Berry et al.'s acculturation model using the BIQ.)

Substance use—The Substance Use Calendar (SUC; Carroll et al., 2004) was used to measure days of substance use (for each class of drug used in the previous 28 days) at baseline, post-treatment (end of 29 days of treatment), and follow-up (12 weeks post-treatment). Participants also completed an abbreviated version of the Addiction Severity Index (ASI; Cacciola, Alterman, McLellan, Lin, & Lynch, 2007), assessing the consequences and correlates of drug use across seven domains/subscales: medical, employment, legal, family/social, psychiatric, alcohol, and drug use. Each domain has a composite score ranging between 0 (no endorsement of any problems) and 1 (maximal endorsement of all problems).

Motivation—The University of Rhode Island Change Assessment Questionnaire (URICA; McConnaughy, Prochaska, & Velicer, 1983) was used to assess participants' level of

motivation to reduce alcohol and drug use. The URICA measures motivation based on Prochaska and DiClemente's (1982) transtheoretical model of change. The measure contains 32 items, all of which assess motivation on a change topic. The Readiness Composite score, which measures readiness to reduce substance use, was used for this article. The Readiness Composite score is calculated by subtracting the mean of the Precontemplation score from the Contemplation, Action, and Maintenance means.

Data Analytic Plan

We compared demographic and baseline treatment variables across acculturation types using chi-squared tests and one-way ANOVAs. Country of origin was not included as a covariate in all analyses because there were no significant differences between acculturation types. Fisher's exact test was used when there were less than five counts for any given variable. Bonferroni corrections were implemented to account for increased probability of Type I errors due to multiple comparisons. To validate the quadrant model of acculturation, Pearson correlations between BIQ scales (Americanism and Hispanicism) and baseline treatment variables were calculated. We then used chi-squared analyses to examine treatment differences among acculturation types at post-treatment and at follow-up, in terms of ASI composite scores and days of alcohol, cocaine, opiate, and marijuana use. Because these dependent variables were zero-inflated (and thus not normally distributed), they were each dichotomized for analysis as categorical variables (0=no reported problems/use; 1=any reported problems/use). The percent of zeros was especially high at post-treatment and follow-up, ranging from approximately 52% to 58% for the total sample, and ranging from 34% to 65% across the 4 different categories. For the dichotomized ASI alcohol composite scores, we used repeated-measures logistic regression modeling to test whether treatment outcomes varied by treatment assignment and acculturation. For the continuous aspects of the data (ASI composite > 0), the distributions at each assessment were positively skewed and a log-transformation was used to approximate normality, followed with repeated-measures linear regression modeling.

Results

Participant Demographics

Of the 405 total participants, 88.4% were male, all reported a Latino/a ethnic background, 92.8% indicated that their primary language was Spanish, and the mean age was 32.5 (*SD*=9.07). In terms of country of origin, 16.1% were U.S. born (not including Puerto Rico), 69.9% were foreign-born (49.5% in Mexico and 20.5% in Central/South America), and 13.58% were born in Puerto Rico but residing in the continental U.S. The mean for the Hispanicism scale was 4.31 (*SD* = 0.72) and the mean for the Americanism scale was 2.99 (*SD* = 1.31). Within the sample, 60.0% stated their primary substance used was alcohol, 21.7% cocaine, 8.6% marijuana, 6.4% opiates, 3.0% methamphetamine, and 0.2% benzodiazepines.

Assessing the Acculturation Model

We first hypothesized that our method of conducting median splits on the Hispanicism and Americanism scales of the BIQ to create Berry et al.'s model of acculturation would be

valid. Support for this hypothesis was obtained through examination the distribution of acculturation types by demographic characteristics. First, there were significant differences between acculturation types by the number of years living in the U.S., $F(3, 214.06) = 27.78$, $p < .001$. Participants in the Integrated group ($M = 19.05$, $SD = 12.50$) lived in the U.S. longer than those in the Separated and Marginalized groups (Games-Howell post-hoc tests, Separated: $M = 10.81$, $SD = 10.25$, $p < .001$; Marginalized: $M = 9.26$, $SD = 7.33$, $p < .001$). Additionally, the Assimilated group ($M = 20.27$, $SD = 13.26$) lived in the U.S. significantly longer than the Separated ($p < .001$) and Marginalized groups ($p < .001$). There were no significant differences between the Integrated and Assimilated groups, nor between the Separated and Marginalized groups, regarding the number of years lived in the U.S. Second, there were differences in years of education between acculturation groups, $F(3, 398) = 13.25$, $p < .001$. The Integration group ($M = 10.55$, $SD = 2.88$) had more years of education than both the Separation group ($M = 8.88$, $SD = 3.14$; $p = .001$) and the Marginalized group ($M = 8.34$, $SD = 3.40$; $p < .001$; post-hoc Tukey-Kramer tests). The Assimilation group ($M = 10.51$, $SD = 2.97$) also reported more years of education in comparison to the Separation group ($p = .002$) and the Marginalized group ($p < .001$). There were no statistically significant differences in years of education between the Integrated and Assimilated groups, and the Separated and Marginalized groups. Finally, there was a significant difference between groups regarding preference of the English language: 12.5% of participants in the Integrated group, 12.4% of the Assimilated group, 0% of the Separated group, and 0% of the Marginalized group (Fisher's Exact Test, $p < .001$).

Level of Acculturation and Baseline Variables

We found some support for our second hypothesis that participants in the Integrated and Assimilated groups would have higher rates of substance use at baseline in comparison to the Separated and Marginalized groups. As shown in Table 1, the Americanism scale was positively correlated with several baseline treatment variables pertaining to substance use frequency and severity (ASI Drug Composite, days of cocaine use, days of marijuana use), whereas the Hispanicism scale was not correlated with any baseline treatment variables.

When we examined whether pre-treatment substance use varied by acculturation group, we found a significant difference between groups in the expected direction for the ASI Drug composite ($x^2(3) = 20.50$, $p < .001$), with the Integrated group reporting the highest levels of drug use problems (67.60%). There were also between-group differences regarding opiate use in the previous month ($x^2(3) = 14.12$, $p = .002$), with the Integrated group more likely to use opiates in the previous month (17.10%). Finally, there was a significant between-groups difference regarding the use of marijuana in the previous month ($x^2(3) = 13.65$, $p = .003$), with the Assimilated group being the most likely to report use (27.80%). See Table 2 for a summary of these analyses.

Post-Treatment and Follow-Up Outcomes

We conducted exploratory analyses to assess the relationship between acculturation and post-treatment and follow-up substance use outcomes. After using Bonferroni corrections to account for multiple comparisons ($p < .004$), there were no statistically significant differences between acculturation groups at either post-treatment or follow-up (see Table 3).

There was a trend in which the Integrated group had higher scores on the ASI Drug Composite post-treatment (p = .016) and at follow-up (p =.025), indicating greater drug use severity.

Time, Acculturation Status, and Treatment Condition

Table 4 provides the results of the ASI Alcohol Composite score from the logistic models, which included a time effect, treatment effect, and time-by-treatment interaction effect for each of the four acculturation types. The time effect was measured at baseline, post-treatment, and follow-up. Only the main effect for time was statistically significant for the total sample and within each of the acculturation types. Subsequent analyses were conducted that utilized the baseline as a covariate, thereby assessing the time effect only from post-treatment to follow-up. The results of these analyses no longer revealed a time effect. This finding was consistent across the four acculturation types, with Integration (p = 0.8461), Assimilation (p = .675), Separation (p = .933), and Marginalization (p = .287), indicating that the previous time effect was due merely to the change from baseline to post-treatment. This finding was consistent for the ASI Drug Composite as well (data not shown).

Discussion

Our study sought to test whether specific acculturation types at baseline were associated with distinct SUD treatment outcomes. Our primary finding was that Latino/a participants seeking SUD treatment with Integration and Assimilation acculturation types had higher levels of substance use and problem severity at treatment entry. These effects were no longer present at post-treatment and at follow-up, suggesting that receiving a culturally-adapted psychotherapy treatment benefited all acculturation types. Our results are novel in that very few studies have examined acculturation with regards to substance use treatment outcomes, especially utilizing a longitudinal design.

Our first aim was to validate our method of measuring acculturation using the Bicultural Involvement Questionnaire (BIQ). The measure captured the four acculturation types predictably, and in the expected direction, with other proxies of acculturation such as the number of years lived in the U.S. and speaking English as a primary language. Therefore, our method of conducting median splits using the Americanism and Hispanicism BIQ subscales may be valuable in future empirical research on acculturation among Latino/as (Farrelly et al., 2013; Farver et al., 2012). By using this method, researchers can examine similarities/differences among the four acculturation types, and compare their findings to the larger literature that has used Berry et al.’s (1987) model.

The finding that participants in the Integration type, especially, reported more substance use at baseline is consistent with other studies in which. acculturation has been linked to increased substance use among Latinos in the US (Caetano et al., 2009; Chartier et al., 2015). We add to the previous literature, in showing that this trend is also seen among a sample of treatment-seekers. Our study is one of only a few that has examined acculturation and substance use specifically within the context of treatment. Within our sample, a measure of Americanism was positively correlated with the ASI Drug composite score (Cacciola et al., 2007), reported days of cocaine use in the previous month, and reported days of

marijuana use in the previous month. Importantly, however, the Hispanicism subscale was not correlated with any pre-treatment substance use and related consequences. There are several possible explanations for these findings. Some studies have suggested that acculturation to the US is associated with an increased prevalence of substance use disorders due to acculturative stress, including the process of adapting to a new culture, potential losses from the previous culture, and discrimination (Ortega, Rosenheck, Alegria, & Desai, 2000; Torres, Driscoll, & Voell, 2012; Unger, Schwartz, Huh, Soto, Baezconde-Garbanati, 2014).

We also found no differences between acculturation types at post-treatment and follow-up, nor was there a statistically significant interaction effect between time, acculturation type, and treatment condition. The only statistically significant main effects were for time, with all four acculturation types reducing their substance use over the course of the study. These findings suggest that although acculturation may be associated with substance use among those seeking treatment at treatment entry, different acculturation types may benefit equally from treatment. This interpretation should be taken cautiously and with full consideration of the context of the study, in which treatments were evidence-based, culturally-adapted, and delivered in Spanish. It is unclear how acculturation would impact treatment processes within clinics that do not meet these conditions (e.g., most clinics do not offer bilingual treatment services). The results of our study are novel in that we demonstrated that despite differences in acculturation, all acculturation types appeared to benefit equally from treatment.

This study has several clinical implications. We found that higher acculturation was associated with increased substance use, consistent with some prior investigations (Caetano et al., 2009; Chartier et al., 2015). Thus, clinicians may want to consider processes associated with acculturation (e.g., acculturative stress, loss of previous culture, discrimination) when assessing clients' substance use. Despite these differences in acculturation, however, it appears that all groups are likely to benefit from substance use treatment. Future research should examine whether evidence-based treatment that is culturally appropriate (as was the case in this study) may help reduce disparities in substance use observed among groups.

This study has several limitations that should be considered. First, there may be limits in the generalizability of these findings, due to the study being restricted to one evidence-based treatment within only five treatment centers in the US, lack of information about what counseling components were utilized in the CAU condition, and a predominantly male sample restricted to Spanish-speaking adults receiving SUD treatment. There may be meaningful differences between Latino/as seeking treatment and those that have clinically high levels of substance use but do not seek treatment, especially given that Latino/as generally do not seek substance use treatment due to multiple treatment barriers (Guerrero et al., 2013). In addition, although our sample consisted of a heterogeneous group of Latino/as from multiple countries of origin and distinct cultural practices, we were unable to examine differences according to country of origin, due to insufficient statistical power. Therefore, these results should be interpreted cautiously when applying them to any specific group of Latino/as. For instance, Latina women represented less than 12% of our total sample, thus

generalization of these results to Latinas should be considered cautiously. Further, our method of measuring acculturation using a median split is specific to this sample of Latino/as. Finally, we did not control for treatment site differences.

Despite these limitations, this study provides data from one of very few studies that has examined acculturation as it relates to substance use treatment. We recommend that future research replicate our methods in other treatment samples. Specifically, to address whether acculturation is linked to substance use treatment outcomes among other groups such as adolescents, and other racial/ethnic groups (e.g., African or Asian immigrants). Future research should also examine how acculturation is associated with treatment outcomes among Latino/as receiving treatment in English, as there may be meaningful differences in levels of acculturation depending on the language in which treatment is received. Finally, it would be of benefit to the substance use treatment field to better understand the mechanisms behind the relationship between acculturation and substance use over time. We have made a meaningful first step in identifying that treatment differences are reduced at post-treatment regardless of acculturation type, and it would be beneficial to examine if the same holds true in other treatment contexts.

Acknowledgments

This investigation was supported by the National Institutes of Health (NIH) under Ruth L. Kirschstein National Research Service Award T32 AA007455 and the National Institute on Drug Abuse grant UG1 DA013714, Clinical Trials Network Pacific Northwest Node. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIH. This study has not been published elsewhere. The results of this study were presented at the 2016 Addiction Health Services Research conference in Seattle, Washington.

References

Alvarez J, Jason LA, Olson BD, Ferrari JR, Davis MI. Substance abuse prevalence and treatment among Latinos and Latinas. Journal of Ethnicity in Substance Abuse. 2007; 6:115–141. [PubMed: 18192207]

Alvarez J, Olson BD, Jason LA, Davis MI, Ferrari JR. Heterogeneity among Latinas and Latinos entering substance abuse treatment: Findings from a national database. Journal of Substance Abuse Treatment. 2004; 26:277–284. [PubMed: 15182892]

Amaro H, Whitaker R, Coffman G, Heeren T. Acculturation and marijuana and cocaine use: Findings from HHANES 1982–84. American Journal of Public Health. 1990; 80:S54–S60.

Arciniega LT, Arroyo JA, Miller WR, Tonigan JS. Alcohol, drug use and consequences among Hispanics seeking treatment for alcohol-related problems. Journal of Studies on Alcohol. 1996; 57:613–618. [PubMed: 8913992]

Arroyo JA, Miller WR, Tonigan JS. The influence of Hispanic ethnicity on long-term outcome in three alcohol-treatment modalities. Journal of Studies on Alcohol. 2003; 64:98–104. [PubMed: 12608489]

Beckett K, Nyrop K, Pfingst L, Bowen M. Drug use, drug possession arrests, and the question of race: Lessons from Seattle. Social Problems. 2005; 52:419–441.

Berry, JW. Conceptual approaches to acculturation. In: Chun, K.Balls, P., Organista Marin, G., editors. Acculturation: Advances in theory, measurement and applied research. Washington, DC: American Psychological Association Press; 2003. p. 17-37.

Berry JW. Acculturation: Living successfully in two cultures. International Journal of Intercultural Relations. 2005; 29:697–712.

Berry JW, Kim U, Minde T, Mok D. Comparative studies of acculturative stress. International Migration Review. 1987; 21:491–511.

Brecht ML, von Mayrhauser C, Anglin MD. Predictors of relapse after treatment for methamphetamine use. Journal of Psychoactive Drugs. 2000; 32:211–220. [PubMed: 10908010]

Brocato J. The impact of acculturation, motivation, and the therapeutic alliance on treatment retention and outcomes for Hispanic drug-involved probationers. Journal of Ethnicity in Criminal Justice. 2013; 11:150–180. [PubMed: 23976877]

Burnam MA, Hough RL, Karno M, Escobar JI, Telles CA. Acculturation and lifetime prevalence of psychiatric disorders among Mexican Americans in Los Angeles. Journal of Health and Social Behavior. 1987; 28:89–102. [PubMed: 3571910]

Cacciola JS, Alterman AI, McLellan AT, Lin YT, Lynch KG. Initial evidence for the reliability and validity of a “Lite” version of the Addiction Severity Index. Drug and Alcohol Dependence. 2007; 87:297–302. [PubMed: 17045423]

Caetano R, Rammisetty-Mikler S, Rodriguez LA. The Hispanic Americans Baseline Alcohol Survey (HABLAS): Rates and predictors of alcohol abuse and dependence across Hispanic national groups. Journal of Studies on Alcohol and Drugs. 2008; 69:441–448. [PubMed: 18432387]

Caetano R, Ramisetty-Mikler S, Rodriguez LA. The Hispanic Americans Baseline Alcohol Survey (HABLAS): The association between birthplace, acculturation and alcohol abuse and dependence across Hispanic national groups. Drug and Alcohol Dependence. 2009; 99:215–221. [PubMed: 18945554]

Carroll KM, Fenton LR, Ball SA, Nich C, Frankforter TL, Shi J, Rounsaville BJ. Efficacy of disulfiram and cognitive behavior therapy in cocaine-dependent outpatients: A randomized placebo-controlled trial. Archives of General Psychiatry. 2004; 61:264–272. [PubMed: 14993114]

Carroll KM, Martino S, Ball SA, Nich C, Frankforter T, Anez LM, Farentinos C. A multisite randomized effectiveness trial of motivational enhancement therapy for Spanish-speaking substance users. Journal of Consulting and Clinical Psychology. 2009; 77:993–999. [PubMed: 19803579]

Chartier KG, Carmody T, Akhtar M, Stebbins MB, Walters ST, Warden D. Hispanic subgroups, acculturation, and substance abuse treatment outcomes. Journal of Substance Abuse Treatment. 2015; 59:74–82. [PubMed: 26362001]

Coatsworth JD, Maldonado-Molina M, Pantin H, Szapocznik J. A person-centered and ecological investigation of acculturation strategies in Hispanic immigrant youth. Journal of Community Psychology. 2005; 33:157–174. [PubMed: 16799699]

Coffin PO, Galea S, Ahern J, Leon AC, Vlahov D, Tardiff K. Opiates, cocaine and alcohol combinations in accidental drug overdose deaths in New York City, 1990–98. Addiction. 2003; 98:739–747. [PubMed: 12780362]

Comas-Diaz L. Hispanics, Latinos, or Americanos: The evolution of identity. Cultural Diversity and Ethnic Minority Psychology. 2001; 7:115–120. [PubMed: 11381814]

De La Rosa M. Acculturation and Latino adolescents’ substance use: A research agenda for the future. Substance Use and Misuse. 2002; 37:429–456. [PubMed: 12064428]

Donaldson TS. Robustness of the F-test to errors of both kinds and the correlation between the numerator and denominator of the F-ratio. Journal of the American Statistical Association. 1968; 63:660–676.

Falicov, CJ. Latino families in therapy: A guide to multicultural practice. New York, NY: Guilford Press; 1998.

Farrelly C, Cordova D, Huang S, Estrada Y, Prado G. The role of acculturation and family functioning in predicting HIV risk behaviors among Hispanic delinquent youth. Journal of Immigrant and Minority Health. 2013; 15:476–483. [PubMed: 22532299]

Farver JAM, Bhadha BR, Narang SK. Acculturation and psychological functioning in Asian Indian adolescents. Social Development. 2002; 11:11–29.

Field C, Caetano R. The role of ethnic matching between patient and provider on the effectiveness of brief alcohol interventions with Hispanics. Alcoholism: Clinical and Experimental Research. 2010; 34:262–271.

Guerrero EG, Marsh JC, Khachikian T, Amaro H, Vega WA. Disparities in Latino substance use, service use, and treatment: Implications for culturally and evidence-based interventions under health care reform. Drug and Alcohol Dependence. 2013; 133:805–813. [PubMed: 23953657]

Kaplan MS, Marks G. Adverse effects of acculturation: Psychological distress among Mexican American young adults. Social Science and Medicine. 1990; 31:1313–1319. [PubMed: 2287960]

LaFromboise T, Coleman HL, Gerton J. Psychological impact of biculturalism: Evidence and theory. Psychological Bulletin. 1993; 114:395–412. [PubMed: 8272463]

Lee CS, Almeida J, Colby SM, Tavares T, Rohsenow DJ. Acculturation, hazardous drinking and depressive symptomatology among Hispanics enrolled in a clinical trial. Addiction Research and Theory. 2015 Advance Online Publication.

Lunney GH. Using analysis of variance with a dichotomous dependent variable: An empirical study. Journal of Educational Measurement. 1970; 7:263–269.

McConnaughy EA, Prochaska JO, Velicer WF. Stages of change in psychotherapy: Measurement and sample profiles. Psychotherapy: Theory, Research & Practice. 1983; 20:368–375.

Miller, WR., Rollnick, S. Motivational interviewing: Helping people change, Third Edition. New York, New York: The Guilford Press; 2013.

Mulia N, Ye Y, Greenfield TK, Zemore SE. Disparities in alcohol-related problems among White, Black, and Hispanic Americans. Alcoholism: Clinical and Experimental Research. 2009; 33:654–662.

National Institute on Drug Abuse. Drug use among racial/ethnic minorities. Rockville, MD: Author; 1998.

O'Malley PM, Johnston LD. Epidemiology of alcohol and other drug use among American college students. Journal of Studies on Alcohol. 2002; 14:S23–S39.

Ortega AN, Rosenheck R, Alegria M, Desai RA. Acculturation and the lifetime risk of psychiatric and substance use disorders among Hispanics. The Journal of Nervous and Mental Disease. 2000; 188:728–735. [PubMed: 11093374]

Polednak AP. Gender and acculturation in relation to alcohol use among Hispanic (Latino) adults in two areas of the northeastern United States. Substance Use and Misuse. 1997; 32:1513–1524. [PubMed: 9336862]

Prendergast ML, Hser YI, Gil-Rivas V. Ethnic differences in longitudinal patterns and consequences of narcotics addiction. Journal of Drug Issues. 1998; 28:495.

Prochaska JO, DiClemente CC. Transtheoretical therapy: Toward a more integrative model of change. Psychotherapy: Theory, Research & Practice. 1982; 19:276–288.

Schwartz SJ, Unger JB, Zamboanga BL, Szapocznik J. Rethinking the concept of acculturation: Implications for theory and research. American Psychologist. 2010; 65:237–251. [PubMed: 20455618]

Sobell, LC., Sobell, MB. Timeline follow-back. In: Allen, J., Litten, RZ., editors. Measuring alcohol consumption. Totowa, NJ: Humana Press; 1992. p. 41-72.

Spence R, Wallisch L, Smith S. Treatment seeking in populations in urban and rural settings on the border. Alcoholism: Clinical and Experimental Research. 2007; 31:1002–1011.

Suarez-Morales L, Matthews J, Martino S, Ball SA, Rosa C, Farentinos C, Carroll KM. Issues in designing and implementing a Spanish-language multi-site clinical trial. American Journal on Addictions. 2007; 16:206–215. [PubMed: 17612825]

Suarez-Morales L, Martino S, Bedregal L, McCabe BE, Cuzmar IY, Paris M, Szapocznik J. Do therapist cultural characteristics influence the outcome of substance abuse treatment for Spanish-speaking adults? Cultural Diversity and Ethnic Minority Psychology. 2010; 16:199–205. [PubMed: 20438158]

Szapocznik J, Kurtines WM, Fernandez T. Bicultural involvement and adjustment in Hispanic-American youths. International Journal of Intercultural Relations. 1980; 4:353–365.

Torres L, Driscoll MW, Voell M. Discrimination, acculturation, acculturative stress, and Latino psychological distress: A moderated mediational model. Cultural Diversity and Ethnic Minority Psychology. 2012; 18:17–25. [PubMed: 22250895]

Unger JB, Schwartz SJ, Huh J, Soto DW, Baezconde-Garbanati L. Acculturation and perceived discrimination: Predictors of substance use trajectories from adolescence to emerging adulthood among Hispanics. Addictive Behaviors. 2014; 39:1293–1296. [PubMed: 24837753]

U.S. Census Bureau. Projections of the size and composition of the U.S. population: 2014 to 2060. Washington, DC: Author; 2015. Retrieved from https://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf

Vega WA, Gil AG, Kolody B. What do we know about Latino drug use? Methodological evaluation of state databases. Hispanic Journal of Behavioral Sciences. 2002; 24:395–408.

Vega WA, Gil AG, Zimmerman RS. Patterns of drug use among Cuban-American, African-American, and White non-Hispanic boys. American Journal of Public Health. 1993; 83:257–259. [PubMed: 8427335]

Worby PA, Organista KC. Alcohol use and problem drinking among male Mexican and Central American im/migrant laborers: A review of the literature. Hispanic Journal of Behavioral Sciences. 2007; 29:413–455.

Zamboanga BL, Raffaelli M, Horton NJ. Acculturation status and heavy alcohol use among Mexican American college students: Investigating the moderating role of gender. Addictive Behaviors. 2006; 31:2188–2198. [PubMed: 16603321]

Zemore SE. Acculturation and alcohol among Latino adults in the United States: A comprehensive review. Alcoholism: Clinical and Experimental Research. 2007; 31:1968–1990.

Table 1

Baseline correlations between Hispanicism, Americanism, and Treatment Variables

	Hispanicism	Americanism
Age	.02	−.04
Years in the United States	−.02	.47*
Months Incarcerated Lifetime	.06	.19*
Years of Education	.11	.32*
URICA Readiness Score[1]	.12	.10
ASI Medical Composite[2]	−.02	.04
ASI Employment Composite[2]	0	.04
ASI Alcohol Composite[2]	.06	−.10
ASI Drug Composite[2]	.10	.26*
ASI Legal Composite[2]	.03	0
ASI Family/Social Composite[2]	−.01	.16*
ASI Psychological Composite[2]	.05	.10*
Days of Alcohol Use[3]	.03	−.04
Days of Cocaine Use[3]	.04	.15*
Days of Marijuana Use[3]	−.01	.15*

Note.

[1] URICA = University of Rhode Island Change Assessment.

[2] ASI = Addiction Severity Index.

[3] Number of days of substance use in the 28 days prior to study enrollment as measured by the Substance Use Calendar.

* Indicates statistical significance after controlling for Type I error with Bonferroni corrections. Bonferroni cut-off equal to $p < .003$.

Table 2

Level of Acculturation and Baseline Characteristics

	Integration ***n*** **= 105**		**Assimilation** ***n*** **= 97**		**Separation** ***n*** **= 99**		**Marginalization** ***n*** **= 99**			
Categorical Variables	*n*	%	*n*	%	*n*	%	*n*	%	X^2 *(df)*	*p*
Gender									13.31 (3)	.004
Male	83	79	87	89.7	89	89.9	94	94.9		
Female	22	21	10	10.3	10	10.1	5	5.1		
Race/Ethnicity									6.86 (9)	.575
Caucasian	8	7.6	2	2.1	8	8.1	3	3		
African American	1	1	-	-	1	1	1	1		
Hispanic	88	83.8	88	90.7	83	83.8	88	88.9		
Multiracial/Other	8	7.6	7	7.2	7	7.1	7	7.1		
ASI Alcohol Composite >0[1]	89	84.8	81	83.5	93	93.9	94	94.9	11.16 (3)	.011
ASI Drug Composite >0[1]	71	67.6	55	56.7	53	53.5	36	36.4	20.50 (3)	<.001*
ASI Medical Composite >0[1]	21	20	27	27.8	26	26.3	29	29.3	2.70 (3)	.440
ASI Legal Composite >0[1]	48	45.7	49	50.5	55	55.6	53	53.5	2.25 (3)	.522
ASI Family/Social Composite >0[1]	61	58.1	60	61.9	51	51.5	51	51.5	3.14 (3)	.371
ASI Psychiatric Composite >0[1]	48	45.7	51	52.6	43	43.4	44	44.4	2.01 (3)	.571
Reported Alcohol Use[2]	85	81	77	79.4	87	87.9	93	93.9	10.82 (3)	.013
Reported Cocaine Use[2]	44	41.9	28	28.9	30	30.3	24	24.2	8.06 (3)	.045
Reported Marijuana Use[2]	26	24.8	27	27.8	14	14.1	10	10.1	13.65 (3)	.003*
Reported Opiate Use[2]	18	17.1	9	9.3	8	8.1	2	2	14.12 (3) *F (df)*	.002*
Continuous Variables	*M*	*(SD)*	*M*	*(SD)*	*M* 33.95	*(SD)*	*M*	*(SD)*	*F (df)*	*p*
Age	31.46	(8.75)	32.69	(8.86)		(9.64)	32.17	(9.01)	1.10 (3, 399)	.254
Years Lived in USA	19.05	(12.50)	20.27	(13.26)	10.81	(10.25)	9.26	(7.33)	27.78 (3, 214.06)	<.001*
Years of Education	10.55	(2.88)	10.51	(2.97)	8.88	(3.14)	8.34	(3.40)	13.25 (3, 398)	<.001*
Months Incarcerated	11.49	(23.84)	13.89	(31.64)	6.04	(18.60)	3.28	(12.54)	4.53 (3, 208.51)	.001*

	Integration *n* = 105		Assimilation *n* = 97		Separation *n* = 99		Marginalization *n* = 99			
URICA[3] Readiness Score	78.46	(18.84)	75.99	(16.17)	76.27	(16.20)	73.28	(11.82)	2.11 (3, 217.18)	.100
Previous Alcohol Treatments	.93	(2.65)	.93	(3.24)	1	(2.72)	.58	(1.55)	.54 (3, 398)	.658
Previous Drug Treatments	1.75	(3.61)	1.05	(3.35)	.92	(2.77)	.48	(1.55)	4 (3, 205.88)	.008
ASI[1] Employment	.74	(.25)	.72	(.26)	.72	(.26)	.71	(.22)	.28 (3, 398)	.842

Note.

[1]ASI = Addiction Severity Index composite scores. Because of zero-inflation, the composite was dichotomized. Participants reporting scores greater than zero are reported above. The ASI Employment composite is an exception and was analyzed as a continuous measure.

[2]Also due to zero-inflation, these variables were dichotomized from the days of substance use in the 28 days prior to study enrollment as measured by the Substance Use Calendar. Participants reporting any substance use are reported above.

[*]Indicates statistical significance after controlling for Type I error with Bonferroni corrections. Bonferroni cut-off equal to $p < .003$.

Table 3

Level of Acculturation, Post-Treatment, and Follow-Up Outcomes

	Integration *n* = 105		**Assimilation *n* = 97**		**Separation *n* = 99**		**Marginalization *n* = 99**			
Post-Treatment Outcomes	*n*	%	*n*	%	*n*	%	*n*	*%*	X^2 (df)	*p*
ASI Alcohol Composite >0[1]	64	61	49	50.50	61	61.60	65	65.70	5.08 (3)	.166
ASI Drug Composite >0[1]	64	61	48	49.50	49	49.50	38	38.40	10.39 (3)	.016
Reported Alcohol Use[2]	56	53.30	45	46.40	50	50.50	50	50.50	.98 (3)	.806
Reported Cocaine Use[2]	38	36.20	29	29.90	32	32.30	31	31.30	1.02 (3)	.797
Reported Marijuana Use[2]	33	31.40	27	27.80	33	33.30	24	24.20	2.33 (3)	.506
Reported Opiate Use[2]	26	24.80	18	18.60	25	25.30	22	22.20	1.58 (3)	.664
Follow-Up Outcomes										
ASI Alcohol Composite >0	60	57.10	45	46.40	59	59.60	55	556	3.94 (3)	.268
ASI Drug Composite >0	51	48.60	35	36.10	44	44.40	29	29.30	9.39 (3)	.025
Reported Alcohol Use[2]	53	50.50	39	40.20	57	57.60	48	48.50	6.01 (3)	.111
Reported Cocaine Use[2]	38	36.20	22	22.70	33	33.30	28	28.30	5.02 (3)	.170
Reported Marijuana Use[2]	30	28.60	22	22.70	29	29.30	23	23.20	1.87 (3)	.600
Reported Opiate Use[2]	22	21	17	17.50	25	25.30	22	22.20	1.78 (3)	.619

Note.

[1]ASI = Addiction Severity Index composite scores. Because of zero-inflation, the composite was dichotomized. Participants reporting scores greater than zero are reported above. The ASI Employment composite is an exception and was analyzed as a continuous measure.

[2]Also due to zero-inflation, these variables were dichotomized from the days of substance use in the 28 days prior to study enrollment as measured by the Substance Use Calendar. Participants reporting any substance use are reported above. Bonferroni cut-off equal to $p < .004$.

Table 4

Longitudinal Logistic Regression Analyses Examining the ASI Alcohol Composite.

	Parameter Estimate	SE	df	t-value	p > t-value
Total Sample					
Intercept	1.7766	0.2430	357	7.31	<.0001
Time	−0.6935	0.0823	357	−8.42	<.0001
Treatment	0.0285	0.3235	357	0.09	0.9300
Time X Treatment	−0.0447	0.1087	357	−0.41	0.6810
Integration					
Intercept	1.8711	0.4393	93	4.26	<.0001
Time	−0.6078	0.1493	93	−4.07	<.0001
Treatment	−0.3946	0.5840	93	−0.68	0.5009
Time X Treatment	0.0016	0.1987	93	0.01	0.9936
Assimilation					
Intercept	1.0228	0.5204	85	1.97	0.0526
Time	−0.6534	0.1805	85	−3.62	0.0005
Treatment	0.4386	0.6739	85	0.65	0.5169
Time X Treatment	−0.0982	0.2250	85	−0.44	0.6636
Separation					
Intercept	1.9378	0.4564	88	4.25	<.0001
Time	−0.5787	0.1490	88	−3.88	0.0002
Treatment	−0.1375	0.6199	88	−0.22	0.8250
Time X Treatment	−0.1485	0.2155	88	−0.69	0.4926
Marginalization					
Intercept	2.1749	0.5615	88	3.87	0.0002
Time	−0.9995	0.2006	88	−4.98	<.0001
Treatment	0.5879	0.7582	88	0.78	0.4402

	Parameter Estimate	SE	df	t-value	p > t-value
Time X Treatment	0.05766	0.2492	88	0.23	0.8176